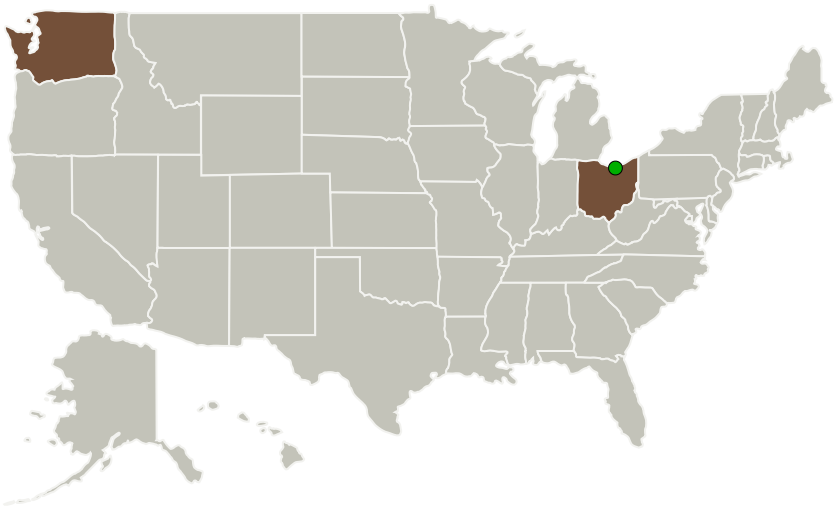
Scalable Lunar Surface Networks and Adaptive Orbit Access, Phase II

Completed Technology Project (2010 - 2012)

Project Introduction

Based on our proposed innovations and accomplished work in Phase I, we will focus on developing the new MAC protocol and hybrid routing protocol for lunar surface networks and orbit access. The new MAC protocol includes a novel mechanism of TDMA overlaying CSMA/CA and ensures scalable throughput and QoS performance in the hierarchical multihop wireless mesh networks proposed for lunar surface networks. The new MAC protocol will be implemented on top of a reconfigurable 802.11 radio and is compatible to legacy 802.11 networks. It also includes advanced features like efficiency power management, adaptive channel width for improving receiver sensitivity and communication range, and error control for eliminate errors due to radiation and radio burst. The hybrid routing protocol combines the advantages of ad-hoc on-demand distance vector (AODV) routing and disruption/delay tolerant network (DTN) routing. Its performance is significantly better than AODV or DTN, and is particularly effective to wireless networks with intermittent links, as in lunar surface networks and orbit access. In this proposal a detailed prototyping plan to implement the developed protocols is also presented. By the end of Phase II, a prototype system will be available for demonstrating the delivered technical objectives proposed in this proposal.

Primary U.S. Work Locations and Key Partners



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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Teranovi Technologies	Lead Organization	Industry	Kirkland, Washington
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Ohio	Washington

Project Transitions

January 2010: Project Start

April 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139427)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Teranovi Technologies

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

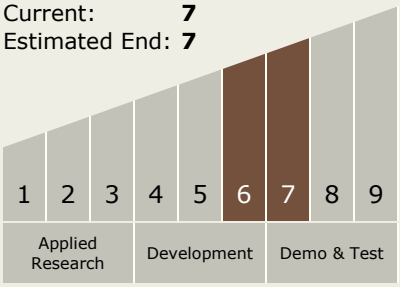
Carlos Torrez

Principal Investigator:

Xudong Wang

Technology Maturity (TRL)

Start: **6**
Current: **7**
Estimated End: **7**



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Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.3 Internetworking
    - TX05.3.2 Adaptive Network Topology

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System